

MUNDY TOWNSHIP

Windfield Estates Subdivision

Road Repair Estimate

April 28, 2014



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Purpose of Evaluation

On April 9, 2014, ROWE Professional Services Company (ROWE) was contacted by Mr. David Guigear from Mundy Township in regards to the Windfield Estates subdivision located off Reid Road just west of I-75. The existing roadways throughout the subdivision are in a poor and deteriorated state. Mr. Guigear requested that ROWE evaluate the existing condition and create a preliminary estimate for bringing the roadways up to Genesee County Road Commission (GCRC) standards along with developing a preliminary project schedule.

This evaluation encompasses the following:

- Identifying the purpose for this evaluation and the project background
- Determining pavement cross section(s) per GCRC guidelines
- Field observations and evaluation of existing conditions
- Evaluation of proposed improvement options
- Suggested improvement options
- Proposed improvements
- Proposed improvement costs
- Proposed construction schedule
- Conclusion

At the conclusion of this report, we hope to identify the pavement issues throughout the subdivision, propose viable improvement options, and provide a cost and schedule for these improvements.

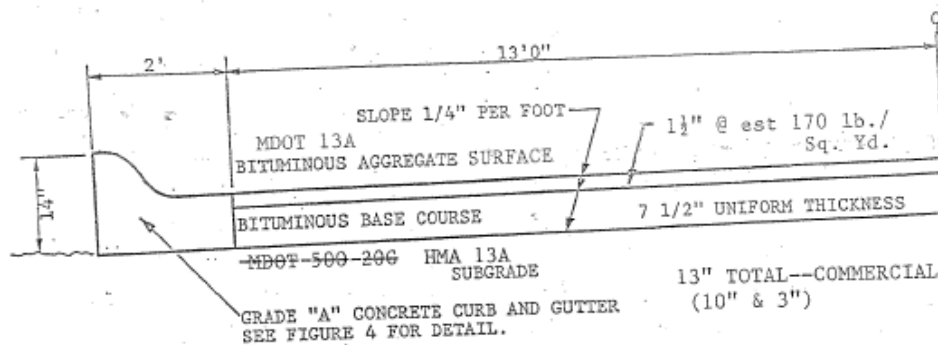
Project Background

ROWE started the evaluation of this project by contacting the GCRC to gather any possible background information that may be available and also verify the desired design standards. During this meeting, the following information was gathered.

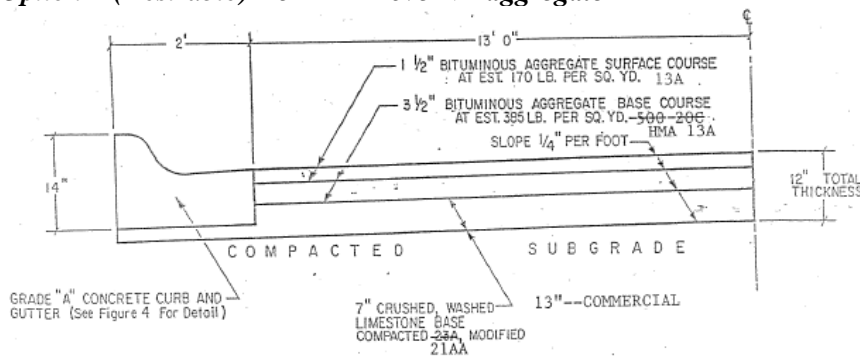
- Windfield Estates, Section 13, Mundy Township, was submitted as a private road development in 1998. The development was constructed as a private subdivision and no GCRC oversight of the interior roadways was performed.
- Since the roadways are private, GCRC is only concerned about the approach area within the existing GCRC right-of-way. If improvements to the approach are made within the GCRC right-of-way, a permit will be needed.
- In July 2013, GCRC performed a cursory review of the subdivision and noted that the existing curb and gutter appeared to be in good condition. However there were concerns with the drainage system and GCRC stated that there is no information regarding the design and construction of the drainage system. It was also noted during our meeting, that Phase 1 proposed a detention pond near Reid Road and it was questioned if this was ever built.
- In July 2013, GCRC estimated approximately 1.6 miles of roadway within the subdivision. An estimate was performed to leave the existing curb and gutter in place and remove and reconstruct the roadway within the curb and gutter (in-lay) with new aggregate base material and HMA. The construction only estimate for this option was calculated at approximately \$1,350,000.

The GCRC also confirmed the standards for roadways as described in the GCRC “Requirements and Specifications for Proposed Plats”. The two options are shown below. GCRC expressed that the desired option is 5 inches of HMA over 7 inches of a 21AA aggregate base.

Option 1 – Full depth HMA



Option 2 (Desirable) – 5" HMA over 7" aggregate



Reviewing the Phase 1 plans that were provided by the GCRC, the pavement cross section detail on the plans is consistent with these requirements. Without any construction as-built plans or field notes, the actual placed pavement section is unknown.

Field Observations and Evaluation of Existing Conditions

A field review of the project performed on April 18, 2014 revealed the following condition of the roadways within the Windfield Estates Subdivision.

Existing Roadways

The existing curb and gutter throughout the subdivision is in good condition and only spot repairs and curb adjacent to drainage structure repairs will need to be replaced.

Pavement condition throughout the subdivision varies from deteriorated to fair. It appears that the newer phases are in much better condition. In many cases this is due not only to the pavement being newer but that it has experienced less construction traffic throughout the life of the pavement.



There are several areas with holes in the pavement located throughout the subdivision. The pavement in these exposed areas, as shown below, appears to only be a couple of inches thick. It is recommended that pavement cores be taken throughout the project limits to determine the existing thickness of the pavement and underlying material. This information will also help us determine the best method for repair for the project.



Pavement is ~2" thick



Existing cracks, but pavement is staying together

In many areas, it is clearly visible whether the existing pavement is in need of repair or not. In other areas, the proposed fix is not so obvious. Areas with existing cracking including severe alligator cracking, as shown above, will be closely inspected. We have found on past projects that if the cracks are holding together, the existing pavement can be salvaged and placing an overlay will extend the pavement life. However, there is a good chance that larger cracks will come through the overlay in a short period, if not fixed. With the overlay option, preventative maintenance on the pavement should be expected much sooner than with a reconstruction. Once the cores have been taken, we will be able to determine the existing pavement thickness. If the pavement is thick enough, surface milling in areas is proposed to help remove the existing cracking. In areas where the pavement is to remain, the existing pavement will need to be cleaned and tack coat placed prior to placing the top layer of HMA.

The existing utilities within the influence of pavement will also need to be considered. Information on utilities, including location and condition, is not known at the current time. Utilities will need to be considered during design and may impact the options for proposed improvements.

Windridge Lane

Windridge Lane provides the only entrance to the subdivision which is located off of Reid Road. The approach area that exists within the GCRC right-of-way appears to be in good condition. South of the entrance, there is a joint line in which the pavement drops down. From visual inspection, it appears that the top layer of HMA was never placed in most areas as the existing HMA is approximately 1 to 1.5 inches below the existing curb. By not placing the top coat, drainage will not properly flow to catch basins, will remain trapped on the roadway between the curb, and can lead to premature deterioration of the roadway.

This roadway is most likely the first roadway that was built. The majority of this roadway is in very poor shape with several potholes and HMA cracking throughout. The uneven pavement and blow outs in the roadway may also indicate that there are subbase or subgrade issues below HMA surface. Drainage is also

questionable along this roadway, and there are several sinking areas next to catch basins and storm crossings that are heaving.

The following are pictures illustrating the condition of this roadway.



Areas in need of reconstruction and possible undercutting

There are also two side streets off this road, Fieldcrest Court and Homestead Court. Both of these roads have had the top layer of HMA placed at some point. There is some minor transverse cracking and there may be a possible issue with one of the storm crossings on Homestead Court. However, both roadways appear to be in good condition.

Proposed Improvements: It is recommended that this entire roadway be removed and reconstructed with the proposed aggregate base and pavement section. Once the pavement has been removed, the subgrade should then be inspected to determine if any undercutting is needed. Storm repairs are also needed throughout including reconstruction near the basins. We also propose to place subgrade underdrain in this section to help facilitate the drainage of the underlying base material.

Overband crack treatment will be proposed for the cracks along Fieldcrest Court and Homestead Court. The bad storm crossing on Homestead Court will be evaluated and replacement along with a pavement repair may be suggested. Other treatments in these areas would require some of the existing HMA to be removed through methods such as cold milling so the gutter would not be filled in with and proposed HMA.

Windwood Lane

The intersection of Windridge Lane and Windwood Lane is in very poor condition and it appears that subgrade issues may be present. West of Windwood Lane, the roadway remains in poor condition until it turns and runs north and south. The north/south section is a combination of decent areas with little cracking, areas with alligator cracking that appears to be holding together, and other areas that are in very poor condition. There are also some bad storm crossing and catch basin areas located throughout. There is one cross street in this section that currently does not have any development on it. Any proposed improvements could be limited to the spring points of this side street in efforts to save money.

West of Windridge Lane, there is a pavement joint and the pavement is in better condition which may indicate that the roadway was built in a later phase. The pavement in this section has some cracking and a few areas which need repair. Storm sewer should also be evaluated throughout.

The following are a few pictures illustrating the condition of this roadway.



Repair Area - Cracks are starting to separate



Overlay Area

Proposed Improvements: It is proposed that the intersection of Windridge Lane and Windwood be removed, undercut, and replaced. Moving to the east, this section of roadway will also need to be removed and replaced. The section that runs north and south will be a combination of pavement repairs and HMA overlay. West of Windridge Lane, the roadway will be overlaid along with a few pavement repairs. Storm sewer repairs will also be needed throughout. Subgrade underdrain will be placed in areas where it can be tied to a catch basin.

Timberline Drive

The section of Timberline Drive that extends east and west is in poor shape. This is especially true on the west end in the lower lying area that may be surrounded by wetlands, indicating the possibility of poor underlying soils. The pavement in this section is wavy and rutting in areas which may also be an indicator of poor underlying soils. The section of roadway extending north and south is in better condition except for at a few drainage crossings that are flooding and holding water. These areas are south of Dellmont Drive and south of Windwood Lane. Drainage should be evaluated throughout, especially in these areas.

The following is a picture of the lower lying section which is cracked and rutted and also a picture of the area in which an HMA overlay is proposed.



Reconstruct Area



Repair and overlay area

Proposed Improvements: The section of roadway extending east and west is proposed to be removed, undercut in areas, and replaced. The section that runs north and south will be a combination of repairs and

HMA overlay. Storm repairs will also be proposed as needed throughout. Subgrade underdrain will be placed in areas where it can be tied to a catch basin.

Dellmont Drive

Dellmont Drive appears to be in fair condition and may be a newer roadway. The existing surface has several cracks but seems to be holding together. The intersection of Dellmont Drive and Timberland Drive is in poor condition. The existing storm should be evaluated throughout this roadway.

The picture below illustrates the condition of this roadway.



Extensive alligator cracking, but still holding together

Proposed Improvements: We recommend that the intersection of Dellmont Drive and Timberland Drive be reconstructed. The remainder of roadway is proposed to be overlaid along with a few pavement repairs, if needed. Storm sewer repairs will be proposed, as needed.

Drainage

Each of the existing catch basins should be evaluated in detail to determine conditions and needed repair. There are several areas in which the roadway next to the curb and gutter has sunk which may indicate that the catch basin is siphoning the underlying base material creating failure. Poor compaction with the original construction is also a possibility. This can be seen in the picture below. In the areas where failure is visible, the surrounding pavement will need to be removed, fill material placed, and properly compacted. Assuming proper compaction was completed, many times during construction the contractor will leave out a brick or a hole which will allow the water to drain until the top course of HMA has been placed. The structures may just need to be repaired or pointed up. During design, all structures throughout the subdivision should be evaluated.

The storm crossings within the roadway should also be evaluated. In several cases, the roadway shows extensive cracking along with sinking or heaving at the crossings, as shown in Picture #2. This is often a sign of poor compaction around the pipe. Each crossing should be evaluated to ensure the integrity of the pipe. ROWE proposes to use our Quickview camera to take a look inside the pipe. At a minimum, if the pipe is in good condition the pavement should be removed, the material around the pipe properly compacted, and then the roadway reconstructed.

While trying to evaluate several of the existing catch basins, it was noticed that the inlet protection fabric is still in place. The fabric aids in keeping debris out of the system but is intended for temporary measures during construction and will restrict drainage. This fabric will need to be removed for proper inspection of the catch basin. However it is recommended that fabric be placed in all catch basins during construction.



Pavement sinking near structure



Heaving cross culvert

Suggested Improvement Options

There are several different options to fix the roadway, each of which may be a viable option. These range from complete reconstruction, which will provide a good roadway for years to come, or minor repairs along with an HMA overlay, which will provide a temporary fix for a short duration. While evaluating the existing roadway, we tried to determine the most economical option for a long term solution that utilizes the existing good areas while replacing the areas that are deteriorated. For the purpose of this evaluation, the proposed fix will incorporate only the area between curb and gutter.

Reconstruction Areas

The existing pavement and underlying material will be removed to provide the proposed pavement section. The proposed section will consist of 7 inches of aggregate base material (21AA crushed limestone) and 5 inches of HMA (HMA, 2C – leveling course and HMA, 13A – top course).

Overlay Areas

In these areas, the existing pavement will be overlaid with approximately 1 – 1.5 inches of HMA to produce the standard reveal at the curb line of ¼ inch. Preparation for this method will include cleaning the existing pavement along with filling cracks and performing repairs, as needed. Depending on the existing pavement thickness, milling could possibly be used to remove some of the existing surface cracks.

Note: The proposed section will be sloped to provide a 2% cross section crowned in the center of the roadway. In the overlay sections, this will help provide a thicker section in the middle of the roadway.

Pavement Repair Areas

These areas will be similar to the reconstruction areas, only they will be small areas within the area to be overlaid. The existing pavement and base material will be removed and then reconstructed as described for the reconstruction areas.

Overband Crack Treatment Areas

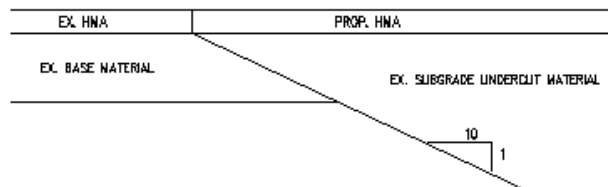
These areas would receive a treatment in which the existing cracks are cleaned and filled with hot rubber or asphalt emulsion. This treatment will help seal the cracks and prolong the life of the roadway. This application would apply to Fieldcrest Court and Homestead Court where the top course of HMA has been previously placed. Pavement repairs may also be combined with this treatment, where needed.

Subgrade Underdrain

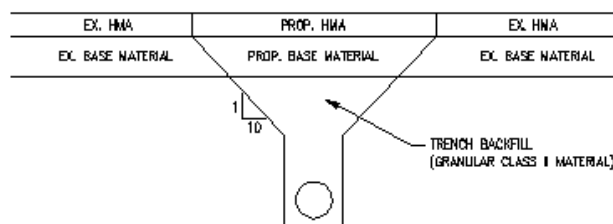
In efforts to improve drainage of the underlying base materials and provide a more stable base, especially in low lying naturally wet areas, it is proposed that subgrade underdrain be utilized. Subgrade underdrain can be placed at the clay grade of the roadway in the reconstruction areas where connecting to existing catch basins are available. This allows the water to drain to a constructed trench at the subgrade level where it is collected in the underdrain and outlets into a drainage structure. Underdrain will be placed as shown in MDOT Standard Plan R-80. In areas where the pavement is to remain and underdrain will be beneficial, a small amount of pavement can be removed along the curb line and the underdrain placed. The pavement area will then be reconstructed.

Undercut Areas

Undercuts are proposed in removal areas in which undesirable soils are present and also at storm repair areas. This will provide a stable base in which the roadway can be built. Undercuts will follow specifications spelled out in the 2012 MDOT Standard Specifications for Construction. It is suggested that undercuts be constructed with a 1 on 10 side slope, so that the potential frost heaving of the pavement will be spread out. The following details demonstrate these methods.



TAPERED LONGITUDINAL SLOPE INTO AND OUT OF UNDERCUT AREAS
(NOT TO SCALE)



TAPERED SLOPE TRENCH (LONGITUDINAL ALONG ROADWAY)
(NOT TO SCALE)

Alternative Improvements

Pavement Patching

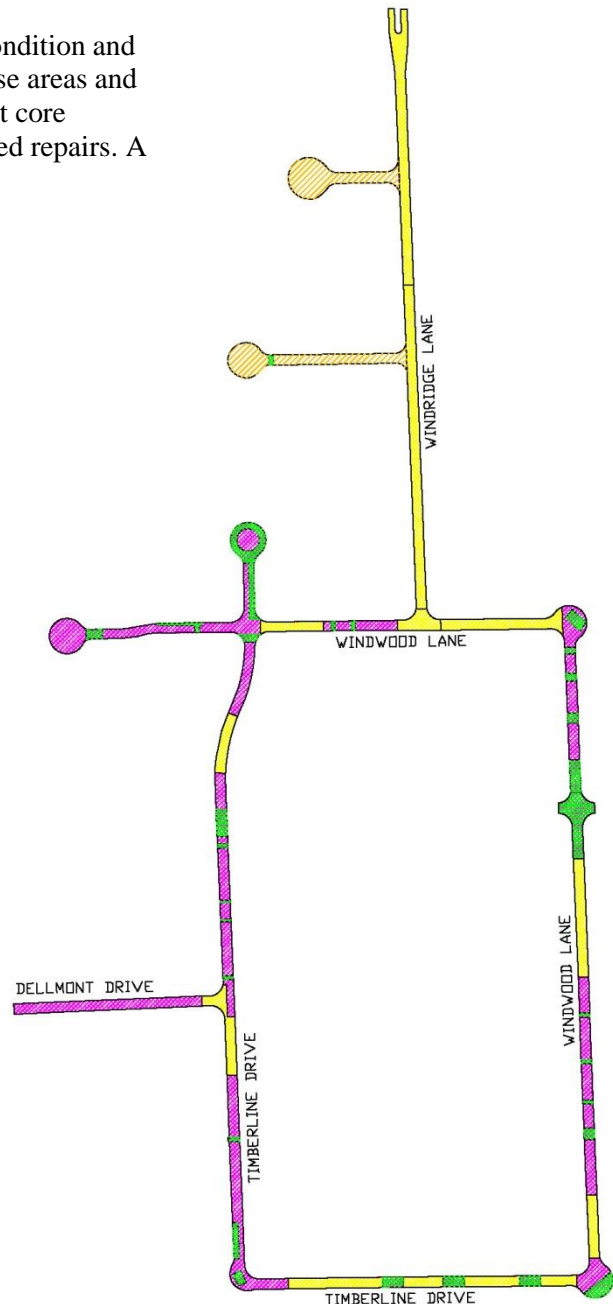
Depending on the existing pavement and aggregate section, it may be possible to remove just the existing HMA, retain the aggregate base material, and replace the HMA. This method will be performed prior to overlaying the roadway. Once cores are obtained, we will further evaluate this option.

Geotextile Fabric

In reconstruction areas, placement of geogrid is a relatively inexpensive way to provide additional base support to the proposed roadway. This is especially desirable in areas with poor underlying base material.

Proposed Improvements

During our field review of the existing roadways, the condition and proposed improvements were noted. During design, these areas and proposed improvements will be more defined. Pavement core information will also be utilized to help determine needed repairs. A larger scale drawing can be provided, as requested.





Improvement Costs

For the purpose of this evaluation, we performed two separate calculations. The first estimate includes leaving the curb and gutter in place and completely reconstructing the pavement. This application would apply to all the roadways within the subdivision except for Fieldcrest Court and Homestead Court which are in good condition. The existing cracks within these two roadways would be sealed with overband crack treatment. The reconstruction option would be consider a long term fix. However with any project preventative maintenance will be needed at some point to extend the life of the pavement as long as possible. This estimate can be used as a baseline for comparison of the different options that may be proposed.

The second option that is presented is to perform the improvements as shown in the previous map. The curb and gutter will also be left in place for this option as well. This fix would be considered to have an intermediate fix life. Preventive maintenance can be expected on the areas to be overlaid within 5 to 7 years. The maintenance needed on the reconstruct areas would be assumed to be the same as if the project was completely reconstructed.

Storm sewer repairs have been included in both options. Any public sanitary sewer or watermain improvements were not considered and are not included in this estimate.

Option #1 – Reconstruction

Cost for Roadway Improvements	\$980,000
Estimated Contingency (10%)	\$98,000
Design Engineering/Pavement Cores/Inspection/Testing (15%).....	\$147,000
Total Overall Costs for Option #1	\$1,225,000

Option #2 – Rehabilitation

Cost for Roadway Improvements	\$740,000
Estimated Contingency (10%)	\$74,000
Design Engineering/Pavement Cores/Inspection/Testing (15%).....	\$110,000
Total Overall Costs for Option #2	\$924,000

Note:

The cost for design and construction engineering services will be better defined as the project moves forward and are just estimated at 15%. Once the decision to move forward is made, we will meet with Mundy Township and subdivision representatives to determine what is expected and better define the cost for design and construction engineering services. Costs for these services will depend on the detail of design and survey and how the evaluation of the existing conditions is completed such as field evaluations and pavement/soil borings. Construction engineering costs will also vary depending on the desired level of oversight, inspection and testing. The costs developed for this estimate represent normal design and construction engineering services.

As shown above, the costs for the rehabilitation option are substantially lower than the full reconstruction option. During design we will further evaluate the existing roadway using additional gathered information and pavement cores and better define the repair vs. overlay sections. Throughout design we will look for ways to decrease project costs while providing a quality end product.



Improvement Schedule

Due to the condition of the roadway, it is anticipated that starting the improvements as soon as possible is most desirable. Looking at a reasonable timeframe for survey, evaluation, and design, it is possible to complete at least part of the project in 2014. With this schedule, design time would be extremely accelerated. However the most deteriorated areas could be repaired in 2014 and the project could be finished in 2015, if completion is not possible this year.

Starting the project in 2015 would allow the designers to better evaluate the roadway, allow more time for review and decisions, and may also yield a more favorable bid since the project will not be as accelerated. ROWE has the capacity to meet the desired schedule and will work with the stakeholders in efforts to meet any desired schedule.

The following provides a look at an accelerated project in which construction could be started in the fall of 2014.

Meeting with Mundy Twp & Subdivision	May 2014
Authorization to Proceed	mid May 2014
Design Survey/Pavement Cores/Evaluation	June 2014
Meeting to discuss preliminary evaluation, options, and costs	late June 2014
Plan Design	July – August 2014
Final Plan Review	mid-August 2014
Final Plans completed and out to bid	early September 2014
Start Construction	October 2014
Finish Construction.....	Fall 2014/Spring 2015

If the construction of the project is pushed to 2015, we anticipate that construction will begin in the spring of 2015 and be completed mid-summer. Every contractor works at a different production rate, but we anticipate that the proposed work could be completed in approximately two months. If the reconstruction option is desired, construction would be longer.

Questions

All the information included in this report is based on a preliminary review, utilizing the information that was available. During design, we would evaluate the roadway in closer detail and work to provide the best fit for the subdivision improvements.

Please do not hesitate to let us know if there are any questions concerning the information provided in the report or if further explanation on any items is needed.